

CITY OF RALEIGH'S WATER SHORTAGE RESPONSE PLAN



Save Water ... Save Life



WSRP Report Prepared by:
The City of Raleigh
Public Utilities Department

2011 WATER SHORTAGE RESPONSE PLANNING TEAM:

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PUBLIC REVIEW & COMMUNITY OUTREACH:

It is recommended by the North Carolina Division of Water Resources, this *Water shortage response plan* (WSRP) shall be made available to utility customers for review. As such, the plan will be accessible through the City website at www.raleighnc.gov under the Environment and Sustainability page. Public comments can be submitted to the Public Utilities Department at waterconservation@raleighnc.gov or at the City Council meeting to be held on September 21st, 2010 at 1:00 p.m. at the Raleigh Municipal Building located at 222 Hargett Street, Raleigh NC.

The Public Utilities Director, or his/her designee, is responsible for developing and maintaining a comprehensive water conservation education program to implement the City's water conservation program and Best Management Practices (BMPs). The City of Raleigh's *Water Conservation Plan* serves as the principal text for the water conservation education program.

ACRONYMS

BMPs =	Best Management Practices
GPCPD (gpcpd) =	Gallons per Capita per Day
MWCs =	Major Water Classes
MWU =	Major Water Users
MGD=	Million Gallons per Day
WSSP =	Water Supply Storage Pool
WCAC =	Water Conservation Advisory <i>Council</i>
RCWG =	Regional Conservation Work Group
OWASA =	Orange Water and Sewer Authority
WSRP=	Water Shortage Response Plan

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EXECUTIVE SUMMARY

During the drought of 2007-2008, it came to the attention of the State, and the City alike, that a detailed plan for reducing water consumption was necessary to protect local water resources. Each public water system is required to provide a *Water Shortage Response Plan* (WSRP) under the North Carolina General Statute 143-355 (I) part of their Local Water Supply Plan (LWSP); additionally, the 15A NCAC 02E. 0607 regulates specific issues which must be addressed within each plan.

The City of Raleigh's average pumpage, during the calendar year 2009, equaled 48 MGD¹. Approximately 64 percent of the City's water consumption is from residential customers; daily consumption averages equal approximately 71 gallons per capita per day (GPCPD)² with this number increasing in the summer months, most likely due to irrigation and other outdoor activities. Therefore, many of the conservation stages detailed within this Plan are focused on reducing residential water consumption.

The City of Raleigh's WSRP and the conservation stages were created in consultation with the City of Raleigh's Water Conservation Advisory Council (WCAC) and in coordination with the Regional Conservation Work Group (RCWG), a collection of surrounding communities including: Apex, Durham, Orange Water & Sewer Authority (OWASA), and Cary. The RCWG has developed stages, with levels of response, in order to minimize confusion for communities whom share the same media outlets.

¹ The average in calendar year 2008 was 44.8 MGD which was the lowest since 2004 due to water conservation during the drought of record.

² Residential consumption was approximately 71 GPDPC in 2009 as determined by Hazen & Sawyer, Technical Presentation Titled *Water Demand and Population Projections*, March 20, 2010.

INTRODUCTION:

The preparation of the City's WSRP is a policy document required by the State of North Carolina (State) after the drought of 2007-2008. In this Plan, the City presents measures which pertain to water conservation and establishing an effective on-going program to regulate the use of WSSP during *water shortages*.

SCOPE:

To include all water customers, residential, industrial, commercial and institutional, within the City of Raleigh's service areas: Raleigh, Garner, Knightdale, Rolesville, Zebulon, Wendell and Wake Forest.

POLICY PRINCIPLES:

It is the mission statement of the City of Raleigh Public Utilities to provide high quality water and wastewater service for our customers while protecting the environment and maintaining public health at a fair and reasonable cost. To this end the City of Raleigh strives to deliver clean and affordable water to all of its water customers; this will continue to be the City's primary goal as long as, in doing so, it does not negate the needs of the natural environment and public health and therefore jeopardizing the sustainability of the City's water resources.

PURPOSE AND INTENT:

The *water shortage* response policies, contained in this document, are considered separate from the permanent water conservation *ordinances* which encourage efficient use of water from all customers. This plan does not thoroughly detail permanent conservation measures, as they are included in the City's Conservation Plan; therefore, the purposes and intents of this document are to:

- Ensure that the available water resources are put to reasonable and beneficial use;

- Initiate a system which will effectively decrease *potable water* demand, in the case of water scarcity; and
- Protect against demand exceeding the *City's* available WSSP storage for water treatment and distribution in case of an impending drought or contamination event.

OBJECTIVES:

The objectives of the *Water Shortage Response Plan* (WSRP) are to establish a policy that will:

- Set an authority for implementing conservation stages;
- Provide *triggers* to signal the commencement and termination of conservation stages;
- Devise levels of response for each *trigger*; these levels will be displayed to the public as conservation stages;
- Create goals for use reduction on both a day-to-day basis and during times of drought; reducing per capita water consumption; and
- Delineate methods for educating both employees and all water *customers* of the current conservation stages and their levels of response.

WATER SUPPLY



WATER SUPPLY:

The City of Raleigh obtains its drinking water supply from two treatment plants. The E.M. Johnson plant utilizes Falls Lake Reservoir which is on the upper Neuse River and managed by the U.S. Army Corps of Engineers. The main body of the lake is in Wake, Durham, and Granville counties. The current maximum treatment capacity of the E.M. Johnson Water Treatment Plant is 86 million gallons per day.

The City's second water treatment plant is the Dempsey E. Benton facility, which utilizes water from Lake Benson, a 500-acre reservoir, and Lake Wheeler, a 650-acre reservoir; together the Swift Creek reservoir system can provide 11.2 MGD for a 50-year reoccurring reliable yield interval. The Dempsey E. Benton water treatment plant opened in May, 2010 and has the capacity to treat up to 20 million gallons a day.

The new Dempsey E. Benton Water Treatment Plant and the E.M. Johnson Water Treatment Plant are expected to meet the area's water needs through 2018. To accommodate water needs beyond 2018, the City of Raleigh plans to expand the E. M. Johnson plant to its maximum capacity of 100 MGD.

While these reservoirs provide the City with its WSSP storage, not all of the water contained within the lakes is designated for Raleigh's water customers. The Falls Lake must also make allotments for flood control, water quality and sediment storage; leaving only 42.3 percent for the WSSP storage. The 45,000 acre-feet of storage in Falls Lake allocated to the City is called the WSSP storage and it can provide 68.4 MGD for a 50-year reoccurring reliable yield interval. Figure 1, illustrates the allotments for Falls Lake.

Falls Lake Project Profile

Elevation at Top of Dam
(291.5ft, MSL)

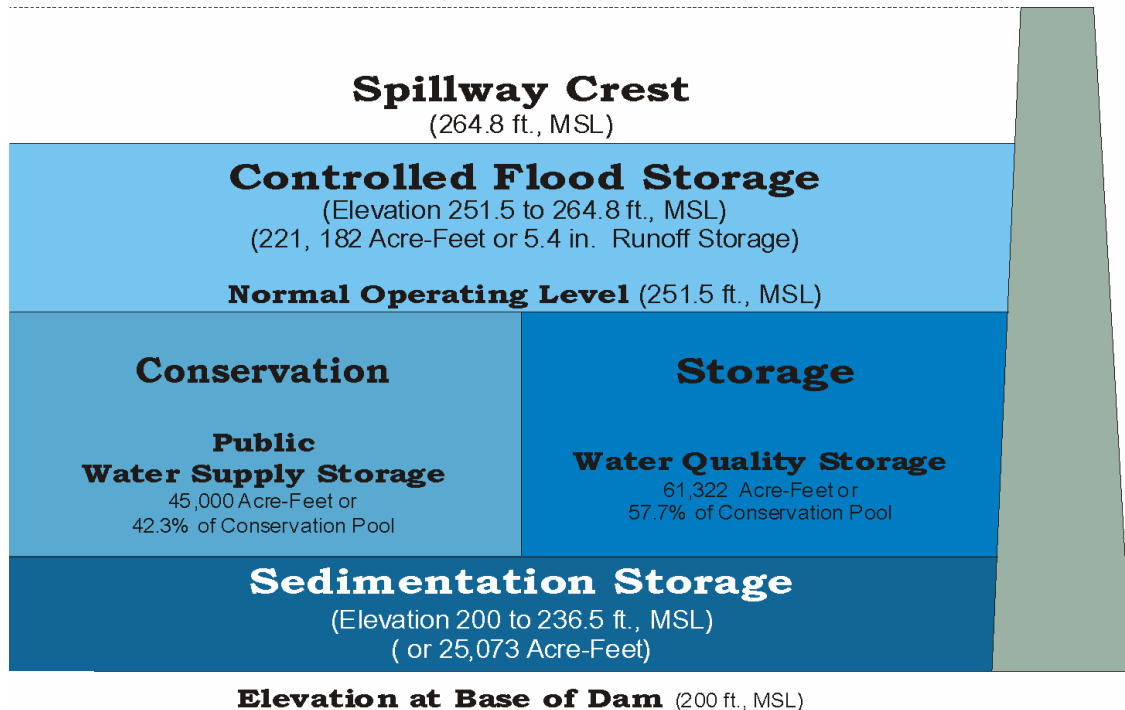


Figure 1. Water allotments for Falls Lake in MSL (Mean Sea Level): flood storage, water supply, water quality and sediment storage.

SEVERITY MEASURES:

Severity measures are the characteristics which indicate the WSSP may be too low to meet anticipated future demands. These measures may be utilized, in combination or separately, to design *triggers* for a water system; this WSRP largely utilizes the available WSSP as its primary severity measure, while the following measures may also be used:

- Current and projected demand
- Average rainfall and reservoir inflows
- Treatment capacity
- OASIS Hydrologic Model
- Mechanical failures
- Source water contamination

WSRP IMPLEMENTATION AUTHORITY



WSRP IMPLEMENTATION AUTHORITY:

The *City Council* may enact water conservation stages prior to the minimum *triggers* within this WSRP.

However, if minimum *water supply triggers* are met without *Council* enacting the corresponding conservation stage, then the *City Manager* will have authority and shall immediately enact the appropriate conservation stage.

In case of the *City Manager's* absence, the *City of Raleigh's* Public Utilities Director is empowered to enact the appropriate conservation stage. But nothing herein shall be construed to prevent the *City Council* from enacting and reversing required water conservation measures irrespective of the triggers established within this WSRP.

AUTHORITY	PRIMARY AUTHORITY	ABSENTEE AUTHORITY
Name:	J. Russell Allen	John R. Carman
Title:	City Manager	Public Utilities Director
Contact:	(919) 996-3070	(919) 831-6044
Email:	Russell.Allen@raleighnc.gov	Carman@raleighnc.gov

REPORTING WATER DATA:

Each morning, daily pumpage readings are sent to the Public Utilities Director and staff. These readings allow the *City* to determine the capacity level of the *water* supply.

The State of North Carolina requires that the *City's* average *water* consumption (in MGD) be reported annually, monthly and within 72 hours of reaching a *trigger* and enacting a conservation stage. The Public Utilities Department will be responsible for this reporting.

TRIGGERS



TRIGGERS:

The City of Raleigh's *triggers* are based on available WSSP at Falls Lake and the *projection period* (the remaining number of days in the calendar year from the date of the water supply projection, plus sixty days).³. The Falls Lake reservoir remains the de-facto gauge for initiating *water* severity measures, while the Dempsey E. Benton will serve as a supplemental water supply to the Falls Lake Reservoir.

The *triggers* for implementing each conservation stage are provided below along with their reverse *trigger*, as conditions return to normal. Table 1, on page 17, details the entry and reverse *triggers* into each conservation stage, along with each level of response.

PERMANENT CONSERVATION MEASURES (PCM) TRIGGER:

There is no implementation *trigger*, nor reverse *trigger*, as this is the minimum level of response and is always in effect.

ADVISORY STAGE TRIGGER:

The advisory stage may be implemented when the WSSP is less than or equal to 70 percent. Because there are no required *water* use restrictions, it can be withdrawn at any time as *water* supply conditions improve.

STAGE 1 TRIGGER:

Mandatory *responses* for Stage 1 will be implemented when the WSSP storage is less than or equal to 50 percent. The reverse *trigger*, signaling the return from this stage to the Permanent Conservation Measures, shall be when the WSSP is equal to or greater than 90 percent, unless forecasted climatic and hydrologic conditions indicate Stage 1 *water* use restrictions should remain in place.

³ The Dempsey E. Benton water treatment plant is operated as a base load facility which will withdraw a maximum of 14 MGD from the Swift Creek reservoir system. The Dempsey E. Benton facility has system supply limitations dictated by minimum release required to protect the aquatic habitat in lower Swift Creek. These release requirements are found within the Biological Opinion for the D.E. Benton project (produced by the U.S. Fish & Wildlife Service, February 23, 2006).

STAGE 2 TRIGGER:

Mandatory *responses* for Stage 2 will be implemented when the PWSS is less than or equal to 30 percent. The reverse *trigger*, signaling the return from this stage to Stage 1, shall be when the WSSP is equal to or greater than 70 percent unless forecasted climatic conditions indicate Stage 2 *water* use restrictions should remain in place.

STAGE 3 TRIGGER:

Mandatory *responses* for Stage 3 will be implemented when the WSSP is less than or equal to 10 percent. The reverse *trigger*, signaling the return from this stage to Stage 2, is when the PWSS is equal to or greater than 50 percent unless forecasted climatic conditions indicate Stage 3 *water* use restrictions should remain in place.

Table 1: Triggers & Corresponding Conservation Stage.

CONSERVATION STAGE	TRIGGER (Listed as % WSSP ¹)	REVERSE TRIGGER ² (Listed as % WSSP)	LEVEL OF RESPONSE	CONSUMPTION GOAL (GPCPD ³)
PERMANENT CONSERVATION MEASURES (PCM)	N/A	N/A	Permanent conservation measures are always in effect Voluntary water use measures and best management practices are always encouraged.	65 gpcpd
ADVISORY STAGE	< 70%	N/A	Residential water customers will be advised that, unless they reduce their water usage by approximately 10% the City may enter Conservation Stage 1.	60 gpcpd
STAGE 1	≤ 50%	≥ 100%	Water customers must abide by required water use reduction and efficiency measures; penalties apply for noncompliance. Water supply conditions are significantly lower than the seasonal norm and water shortage conditions are expected to persist.	55 gpcpd
STAGE 2	< 30%	> 70%	An intense level of water use reduction and efficiency measures is required to avoid entering Stage 3- emergency rationing. Penalties for non-compliance are much higher than previous stage.	35 gpcpd
STAGE 3	< 10%	> 50%	Water supply conditions are substantially diminished and the remaining supply must be allocated to preserve human health and environmental integrity.	25 gpcpd

¹ WSSP, water supply storage pool

² Reverse triggers will serve as a guideline and the City Manager will reserve the right to remain within each stage if forecasted climatic conditions indicate water use restrictions should remain in place.

³ GPCPD = gallons per capita per day

CONSERVATION STAGES & LEVEL OF RESPONSE



CONSERVATION STAGES & LEVEL OF RESPONSE:

Once a *trigger* has been reached, the WSRP Authority will enact the corresponding Conservation Stage. Each stage is characterized by its own level of response, or necessary restrictions which must be implemented to preserve adequate *water* supply. *Council* has the right to implement and reverse *water* conservation stages prior to the triggers established within this WSRP being met.

This section details the five conservation stages in terms of their level of response, or restrictions. These stages include: Permanent Conservation Measures (PCM), and stages 1, 2 and 3. Table 2, on page 28, summarizes the outdoor restrictions for each stage.

RESPONSE: PERMANENT CONSERVATION MEASURES (PCM)

ALL residential *water customers* are requested to limit their consumption to 65 GPCPD¹; and abide by the BMPs listed in Appendix A. The additional *responses* are required of **ALL** *water customers*:

- 1) Three days of irrigation per week with alternating days for in-ground automated, non-automated systems and hose-end systems.
 - Automatic spray irrigation and Non-Automatic spray irrigation systems:
Watering by spray irrigation systems shall be permitted between MIDNIGHT and 10:00 AM. Properties with ODD numbered addresses may water lawns and landscapes only on Tuesday, Thursday & Saturday. Properties with EVEN numbered addresses may water only on Wednesday, Friday & Sunday.

¹ gpcpd = gallons per capita per day

- Hose-end sprinkler:

Watering by hose-end sprinklers shall be permitted between 6:00 AM to 10:00 AM and also between 6:00 PM and 10 PM. Properties with ODD numbered addresses may water lawns and landscapes only on Tuesday, Thursday & Saturday. Properties with EVEN numbered addresses may water only on Wednesday, Friday & Sunday.

- 2) **ALL** irrigation systems and *water customers* must operate in a manner to prevent *water waste* and the application onto impervious surfaces, such as streets; sidewalks; parking lots and driveways.
- 3) Restaurants to only serve *potable water* when requested by patrons.
- 4) Hotels to only change linens when requested by guests.

The following responses are volunteer actions:

- 1) Irrigation of landscapes are recommended to have a maximum of one inch per week. All *water customers* are expected to monitor their *water* usage to determine the weekly irrigation volume.
- 2) New Landscape establishment permits are allowed at anytime up to 45 days from installation.
- 3) Water plants deeply and less frequently to encourage root growth.
- 4) Identify and repair all *water* leaks.
- 5) Wash only full loads in washing machines and dishwashers.
- 6) Use spring-loaded nozzles on garden hoses.

Restaurants to only serve *potable water* when requested by patrons.

RESPONSE: ADVISORY STAGE

ALL residential *water customers* are requested to reduce their *water* usage to 60 gpcpd in efforts to minimize the chances of entering Stage 1. Permanent conservation measures will remain intact; however, no other mandatory *responses* will be enforced. Voluntary *water* use measures and best management practices (BMPs), as outlined in Appendix A, are always encouraged. At its discretion, the Raleigh City Council may regard this advisory stage as an opportunity to commence stage 1, and it may act accordingly.

RESPONSE: STAGE 1

ALL *water* residential *customers* are requested to reduce their *water* usage to 55 GPCPD; Public Utilities education and outreach programs will encourage *water* conservation and efficiency measures. In addition to the previous conservation advisory stage, the following *responses* apply during Stage 1:

STAGE 1 OUTDOOR WATER USES:

Irrigation *water* must be applied slowly to achieve deep penetration and prevent *water* run-off. Direct watering of impervious surfaces such as streets, parking lots, driveways and sidewalks is prohibited.

1) Automatic spray irrigation and Non-Automatic spray irrigation systems:

Watering by spray irrigation systems shall be permitted between MIDNIGHT and 10:00 AM. Properties with ODD numbered addresses may water lawns and landscapes only on TUESDAYS. Properties with EVEN numbered addresses may water only on WEDNESDAYS.

2) Hose-end sprinkler:

Watering by hose-end sprinklers shall be permitted between 6:00 AM to 10:00 AM and also between 6:00 PM and 10 PM. Properties with ODD numbered addresses

may water lawns and landscapes only on TUESDAYS. Properties with EVEN numbered addresses may water only on WEDNESDAYS.

- 3) Hand held hose watering devices shall be permitted at anytime.
- 4) Low Volume Drip Irrigation: Watering by low volume drip irrigation is permitted at any time.
- 5) New Landscape Establishment Permits will not be issued.
- 6) Leaking water services or plumbing must be repaired within 48 hours of written notification by the Public Utilities Director.

EXEMPTIONS to irrigation requirements:

The watering restrictions shall not apply to:

- 1) Properties using non-potable/reuse water and non WSSP system of the City for landscape irrigation.
- 2) Watering of commercial containerized plants and commercial plant stock in trade maintained for resale.
- 3) Visually supervised operation of watering systems for short periods of time to check system condition.
- 4) Irrigation of athletic fields.

STAGE 1 INDOOR WATER USES:

- 1) Drinking water shall not be served in a public restaurant, except upon request.
- 2) Hotels/motels/bed and breakfast inns will ask guests spending more than one night to use their towels and bed linens more than once between laundering.
- 3) Commercial and industrial customers shall review their water uses and implement industry specific best management water conservation practices.
- 4) Leaking water services or plumbing must be repaired within 48 hours of written notification by the Public Utilities Director.

RESPONSE: STAGE 2

ALL residential *water customers* are requested to reduce their *water usage* to 35 gpcpd. In addition to the previous conservation stages, the following *responses* apply during stage 2:

STAGE 2 OUTDOOR WATER USES:

Irrigation *water* must be applied slowly to achieve deep penetration and prevent *water* run-off. Direct watering of impervious surfaces such as streets, parking lots, driveways and sidewalks is prohibited.

- 1) Leaking *water* services or plumbing must be repaired within 48 hours of written notification by the Public Utilities Director.
- 2) Watering by automatic spray or non-automatic irrigation is prohibited.
- 3) Watering by hose-end sprinklers is prohibited.
- 4) Watering by low volume drip irrigation is permitted at anytime.
- 5) New Landscape Establishment Permits will not be issued.
- 6) Watering by held hose watering devices shall be permitted at anytime .

EXEMPTIONS to irrigation requirements:

- 1) Properties using non-potable/*reuse water* and non WSSP system of the City for landscape irrigation.
- 2) Watering of commercial containerized plants and commercial plant stock in trade maintained for resale.
- 3) Irrigation of athletic fields.

STAGE 2 INDOOR WATER USES:

- 1) Drinking *water* shall not be served in a public restaurant, except upon request.
- 2) Hotels/motels/bed and breakfast inns will ask guests spending more than one night to use their towels and bed linens more than once between laundering.

- 3) Commercial and industrial *customers* shall review their *water* uses and implement industry specific best management *water* conservation practices.
- 4) Leaking *water* services or plumbing must be repaired within 48 hours of written notification by the Public Utilities Director.

RESPONSE: STAGE 3

ALL residential *water customers* are expected to reduce their *water* usage to 25 gpcpd. In addition to the previous conservation stages, the following *responses* apply during stage 3:

STAGE 3 OUTDOOR WATER USES:

Uses of the City WSSP are prohibited as follows:

1. Prohibited irrigation:
 - Irrigation of athletic fields.
 - Watering by handheld watering devices.
 - Watering of commercial containerized plants and commercial plant stock in trade maintained for resale.
 - Watering by low volume drip irrigation.
2. Filling new swimming or wading pools is prohibited. Filling of pools drained for repair after the effective date of Stage 3 mandatory restrictions and rules is prohibited. *Potable water* may be added to pools to maintain sanitary operating conditions.
3. Washing vehicles at any location is strictly prohibited,
 - Except as specifically approved by the Public Utilities Director for the purpose of maintaining public health and sanitary conditions of the vehicles.
 - Except car wash facilities certified by the City Public Utilities Director and which reclaim 50% or more of their wash *water* may continue to operate. All certified vehicle wash facilities, immediately following certification shall display at the entrance of the facility the approved for *water* conservation placard issued by the City's Public Utilities Department at all times.

- Any vehicle wash facility that is not certified by the Public Utilities Director shall not be permitted to use *City of Raleigh water supplied water* for operation during Stage 3 mandatory water conservation restrictions and rules until it is in compliance with the requirements of the conservation certification program or until the Stage 3 mandatory water conservation restrictions and rules are repealed.
4. Washing of areas such as sidewalks, patios, decks, driveways, parking lots, streets and exterior building surfaces is strictly prohibited. This restriction shall not apply to the washing of soiled areas for maintenance of public health and sanitary conditions.
 5. Water use for the purpose of filling, flushing, pressure and bacteriological testing of new water mains extensions permitted by the *City* after the effective date of this ordinance is strictly prohibited, until this stage is reversed by the *City*,
 - Except for new water mains that are filled and tested with Raleigh supplied water that is completely captured in tanker trucks previously certified by the *City* Public Utilities Director for use in water conservation recycling and transport of such water to the *City's* E.M. Johnson Water Plant. No tanker trucks shall be certified for such use unless they have been previously tested by the *City* to verify they are suitable for water transport and meet the minimum capacity needed to permit the *City's* standard new water main flushing and testing. All direct *City* costs associated with certification of tankers, testing, inspection, transport and recycling, including the cost of the water, shall be recovered by the *City* as determined by the Public Utilities Director, for water main extensions constructed by private sector development, prior to these water main being permitted for operation, service and certificates of occupancy issued for facilities served from the water mains.

6. Water use from *hydrant meters* is prohibited unless specifically authorized by the Public Utilities Director for washing of soiled areas for maintenance of public health and sanitary conditions.
7. Leaking *water services* or plumbing will be interrupted immediately upon notification to the City's Public Utilities Department. Once repairs are completed by the *customer* or their agent, the *water service* will be restored.
8. The application of *reuse water* on the landscape is encouraged and not regulated by the City's *water conservation ordinance s*.

EXEMPTIONS to irrigation requirements:

1. Properties using non-potable/*reuse water* and non-WSSP system of the City for landscape irrigation.

STAGE 3 INDOOR WATER USES:

1. Drinking *water* shall not be served in a public restaurant, except upon request
2. All *non-essential* use of *water* for commercial or public use is prohibited.
3. Buildings with *water-cooled* air conditioners or heating equipment that does not recycle City supplied *water* must adjust thermostats to the highest or lowest settings available, respectively, except when occupant health and safety are adversely affected.
4. Hotels/motels/bed and breakfast inns will ask guests spending more than one night to use their towels and bed linens more than once between laundering.
4. Paper plates must be used in food industries.
5. *Major Water Customers* shall review their *water* uses and implement industry specific best management *water* conservation practices.
6. Leaking *water services* or plumbing will be interrupted immediately upon notification to the City's Public Utilities Department. Once repairs are completed by the *customer* or their agent, the *water service* will be restored

RESPONSE: EMERGENCY WATER SHORTAGE

Drought is only one possible cause of drinking water shortage; water systems may also experience short-term problems with water treatment, distribution or contamination. It is essential to establish a WSRP responsive to all types of water shortage. In the event of emergency water shortage, the City's authority shall implement water shortages responses as defined in Stages 1, 2, and 3 as deemed appropriate.

Table 2: Irrigation & Outdoor Responses During Water Conservation Stages.

ACTIVITY	Permanent & Advisory	Stage 1	Stage 2	Stage 3
Auto & Non-Auto Spray irrigation systems	Odd: Tue, Thurs, Sat Even: Wed, Fri, Sun Times: 12-10 am	Odd: Tuesday Even: Wednesday Times: 12-10 am	Prohibited	Prohibited
Hose end sprinklers	Odd: Tue, Thurs, Sat Even: Wed, Fri, Sun Times: 6-10 am & 6-10 pm	Odd: Sat Even: Sun Times: 6-10 am & 6-10 pm	Prohibited	Prohibited
Hand-held Hose	Allowed	Allowed	Allowed	Prohibited
Bucket Watering	Allowed	Allowed	Allowed	Prohibited
Drip Irrigation	Allowed	Allowed	Allowed	Prohibited
Athletic Field Irrigation	Allowed	Allowed	Allowed	Prohibited
New Landscape Est. Permit	Anytime for 45 days from installation	Prohibited	Prohibited	Prohibited
Swimming Pools	Allowed	Allowed	Allowed	Top off for sanitary purposes only
Car Washing	Allowed	Allowed	Allowed	Reclaimed Commercial car washes & some self service bays
Pressure Washing	Allowed	Allowed	Allowed	Prohibited except for sanitary, health exceptions or reclaimed waters
Reuse Water	Allowed	Allowed	Allowed	Allowed
PCM: Irrigation of landscapes is recommended at a maximum of one inch per week				
Stage 1: Irrigation of landscapes is recommended at a maximum of one-half inch per week				
Stage 2: Irrigation of landscapes is limited to hand-held hose, bucket watering, athletic fields and drip irrigation.				
Stage 3: ALL Irrigation is eliminated				

ADDITIONAL CONSERVATION MEASURES

February 8, 2008
Dear Raleigh Water Customer:



The City of Raleigh received information on February 5th from the National Weather Service indicating the current long term weather forecast. According to this report, the severe drought continuing in North Carolina has been experiencing over the past eight months will very likely continue for 6 months. With the current, unprecedented low water level in Falls Lake for this time of the year, the City must now proceed to implement Stage 2 Mandatory Water Use restrictions of the City's Water Conservation Plan. The Stage 2 restrictions were approved by the Raleigh City Council on February 5th at 12:01 AM Friday, February 15, 2008.

Please refer to the City's web page at www.raleighnc.gov for complete detailed information on the Stage 2 Water Conservation Plan. The chart below is a quick summary of the restrictions for the typical customers:

TYPE OF WATER USE	STAGE 2 IMPACT
Automatic & Non-Automatic spray irrigation systems	PROHIBITED
Certified automatic spray irrigation systems and certified golf course alternative systems	PROHIBITED
Hose end sprinklers (e.g. single stream, multi-stream, and impact type sprinklers)	PROHIBITED
Hand held hose irrigation	PROHIBITED
Drip irrigation	PROHIBITED
Swimming Pool filling	PROHIBITED
Vehicle Washing	PROHIBITED
Watering homes, roads, driveways, sidewalks, and other such outdoor surfaces, includes car washing and street / parking lot cleaning	PROHIBITED OK to add minimal water to maintain sanitary conditions.
Water use restrictions apply to all City of Raleigh water customers.	PROHIBITED City Certified water conserving vehicles may continue to use.
Violation of the Stage 2 mandatory water use restrictions will result in a \$1,000 fine.	PROHIBITED Maybe permitted for rare circumstances necessary to maintain sanitary and protect public health.

Violation of the Stage 2 mandatory water use restrictions will result in a \$1,000 fine. In the event of an interruption of water service from the City of Raleigh, please contact our staff regarding the Stage 2 Water Use Restrictions, please contact our staff at e-mail: waterconservation@ci.raleigh.nc.us.

ADDITIONAL CONSERVATION MEASURES:

Due to public perceptions and the manner in which *water* is used, it was determined that the following *water customers* need to take steps to reduce *water* usage during an impending *water* shortage. These steps need to look at both short-term and long-term *water* conservation measures. Additionally, **ALL** *water customers* are encouraged to abide by the list of Best Management Practices (BMPs), outlined in Appendix A.

GOLF COURSES:

Originally, golf courses were regulated under the same irrigation rules as residential landscapes. Thus, under Stage 2, these facilities were not permitted to irrigate any part of their property, thereby exposing the greens and tee boxes to permanent damage. However, due to their employment capacity, careful monitoring of *water* use (i.e. too much *water* can be detrimental to turf grasses), and financial investment in the greens, it has been decided that an increasing percent reduction system be created for golf courses during each conservation stage.

STAGE 1:

Golf courses will reduce *water* usage by 25 percent based on a 5-year non-restrictive average.

STAGE 2:

Golf courses will reduce *water* usage by 50 percent based on a 5-year non-restrictive average.

STAGE 3:

Golf courses will reduce *water* usage be 75 percent based on a 5-year non-restrictive average.

The following additional measures shall be adopted under each conservation stage:

- Educate patrons and employees on the need to conserve water and how to prepare for drought conditions;
- Inspect water delivery system components;
- Investigate alternative grass selections and other options;
- Ensure that existing equipment is operating as efficiently as possible;
- Stay abreast of recent technologies and set feasible plans for retrofitting.

CAR WASHES⁵:

As part of the City's conservation plan, a Car Wash Certification program was created to encourage local car washes to conserve water and properly maintain their systems. The certification has been very successful. However, in some cases this created an impression that all Certified Car Wash facilities used reclaimed water, which is not necessarily always the case.

Certification criteria for automatic car wash systems require that, if facilities do not use a water reclamation system its basic wash package must consume less than 55 gallons.

All vehicle wash facilities that desire to be *approved shall* comply with the requirements of the latest conservation certification program of the City for vehicle wash facilities. Any vehicle wash facility that is not certified by the Public Utilities Director and which does not reclaim 50% or more of the wash water *shall* be closed during Stage 3 mandatory water conservation restrictions and rules until it is in compliance with the requirements of the *conservation certification program* or until the Stage 3 mandatory water conservation restrictions and rules are repealed. All certified vehicle wash facilities, following certification, *shall* display at entrance of the

⁵ Unless otherwise enforced under **SECTION 8.** G.S. 143-355.2(h1)

facility the *approved* for water conservation placard issued by the Public Utilities Department at all times.

HOSPITALITY: RESTAURANTS & HOTELS:

Under this Plan all hospitality service providers will be required to educate patrons and employees on the need to conserve *water* and how to prepare for drought conditions. All service providers will adhere to the following measures:

- Drinking *water* shall not be served in a public restaurant, except upon request.
- Hotels/motels/bed and breakfast inns will ask guests spending more than one night to use their towels and bed linens more than once between laundering.
- Retrofit inefficient *water* devices: toilets, aerators, etc. when feasible;
- During Stage 3, paper plates must be used.

RALEIGH'S MAJOR WATER CUSTOMERS (MWCs)



RALEIGH'S MAJOR WATER CLASSES (MWCs):

Figure 2 and Table 3 illustrate the City of Raleigh's six Major Water Customer (MWC) classes; the two largest classes being residential and commercial, using 26.78 MGD and 10.83 MGD, respectively. While the remaining sectors, Industrial and Institutional, use 1.36 MGD and 2.56 MGD, respectively. Hence, the justification for targeting stages to reduce residential water usage.

ALL water customers are instructed to abide by the list of Best Management Practices (BMPs), outlined in Appendix A.

WATER CUSTOMER	AVERAGE MGD
RESIDENTIAL	26.78
COMMERCIAL	10.83
INSTITUTIONAL	2.56
INDUSTRIAL	1.36
CITY OWNED	0.41
INTER-MUNICIPAL	0.05

Figure 3: Average million gallons per day (MGD) per each water user.

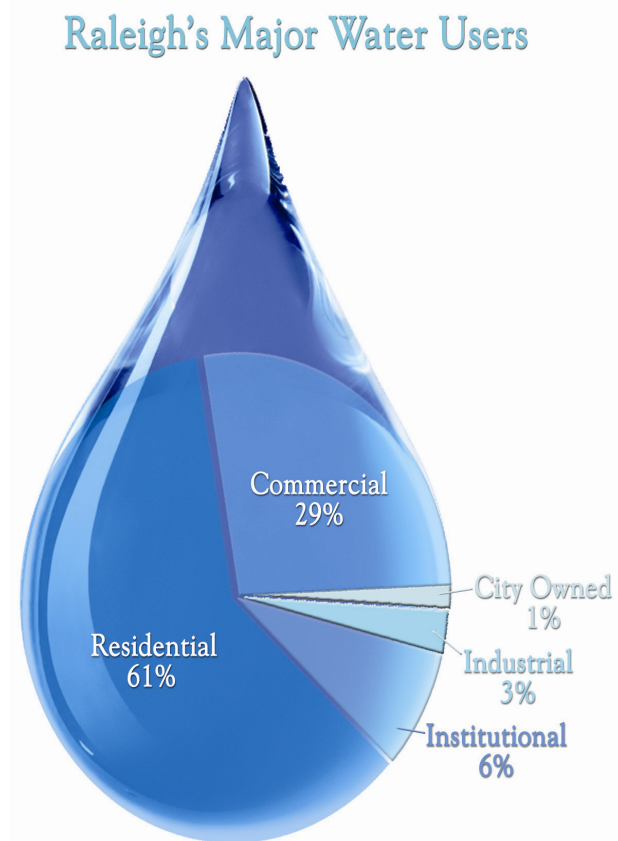


Figure 2: Raleigh's MWCs, major water classes, 2009.

MAJOR WATER USERS (MWUS):

Major Water Users (MWUs) are a subset of Major Water Classes (MWCs) who consume 100,000 gallons or more per day.⁶

The drought of 2007-2008 illustrated that the closing of some business did little to ease *water* demand. Additionally, several MWUS have already implemented *water* efficient upgrades and consequently cannot make further reductions without reducing and/or halting production altogether. To combat these issues all MWUs are required to complete the following:

- Conduct an AWWA certified *water* audit⁷. All MWUs will receive notice to complete a *water* audit. Upon receipt of this notice, all MWUs will have 90 days to complete and audit and submit the results.
- *Water* audits will be individually assessed and a timeline for retrofitting will be determined by the City and the MWU, if retrofitting changes are deemed necessary.

⁶ If there is any confusion concerning a water customer's status as a MWC, please contact Public Utilities Department.

⁷ Audits may be prepared by either a company employee or an outside agency as long as it abides by AWWA standards. Audits will need to be repeated every five years.

NOTIFICATION:

Employees and the public will be notified of a conservation stage's implementation, along with the corresponding level of response (i.e. restrictions), via the following methods:

EMPLOYEES	WATER CUSTOMERS
Personal Communication	Utility Water Bills
Telephone Call	Inter-Office Mail Communication
Email Notification	City of Raleigh's Website
Notices at City Buildings	Raleigh News & Observer
City of Raleigh's Newsletters	
Communications Via Code Enforcement Officers	
PSA's (Public Service Announcements)	

Table 1. Methods of notification of stages and their levels of response.

Table 4. Methods of notification of stages and their levels of response.

ORDINANCES & ENFORCEMENT

City of Raleigh
Public Utilities Department

AN ORDINANCE TO ESTABLISH STAGE I AMENDED MANDATORY WATER CONSERVATION RESTRICTIONS AND RULES, & TO PROVIDE PENALTIES FOR VIOLATION OF SAID RESTRICTIONS AND RULES

Whereas, current conditions are causing excessive demand and emergency shortages in the City's water supply reservoirs; and

Whereas, Every Day Water Conservation Rules and previous Stage I Mandatory Water Conservation Restrictions and rules have not resulted in sufficient reduction of the average day customer water demand at the water plant; and

Whereas, it is necessary to implement additional mandatory water use controls in order to protect the public health, safety, and welfare through the provision of adequate water for drinking, sanitation, and fire protection services;

***You have been found in violation of the City's
Stage I Amended Mandatory Water Conservation
Restrictions:***

***The following guidelines must be followed for the
duration Of the Conservation period:***

Outdoor Water Uses:

Watering by Automatic and non-automatic spray irrigation systems is **PROHIBITED**.

Watering by Hose-end sprinklers and soaker hoses is **PROHIBITED**.

New Landscape Establishment Permits **WILL NOT** be issued. Vehicle washing is **ONLY** allowed at commercial car wash facilities.

Hand Held Hose End Watering Devices:

Hand held hose end watering devices shall be permitted between the hours of 6:00AM to 10:00AM and also between the hours of 6:00PM to 10:00PM. Properties with **ODD** numbered addresses may water on Tuesdays and Saturdays. Properties with **EVEN** numbered addresses may water on Wednesdays and Saturdays.

ENFORCEMENT:

City of Raleigh's *enforcement ordinances* are located in Article E. The following Stage violations have been extracted from this *ordinance* and listed below and summarized in Table 5.

Conservation Stage	Citation(s): Level of Offense ¹			
	First Violation	Second Violation	Third Violation	Fourth Violation
Permanent Conservation Measures	Warning	\$50	\$200	Interruption of Service
Stage 1	\$100	\$500	Interruption of Service	N/A
Stage 2	\$500	Interruption of Service	Interruption of Service	N/A
Stage 3	\$1000	Interruption of Service	Interruption of Service	N/A

¹ According to Article E (2010). All fines are based on the current conservation stage and the level of offense. Fines do not vary for differing meter sizes.

of compliance.

VIOLATIONS OF STAGE 2:

Violation of this *ordinance* may be punished by any of the means available to the City through the provisions of N.C.G.S 160A-175. The civil penalty amount for the first violation of this *ordinance* is \$500.00 and a reoccurring violation may result in interruption of water service to the offending customer. The City will issue written notification to the customer and occupant of intent to interrupt water service and twenty-four (24) hours later will interrupt water service unless the violation has ceased. Each day shall constitute a separate violation. If water service has been interrupted due to repeat violation of this *ordinance*, service will not be re-instated

until the Public Utilities Director has determined that the risk to the *City water* supply has been alleviated or the Public Utilities Director is otherwise assured of compliance.

VIOLATIONS OF STAGE 3:

Violation of this *ordinance* may be punished by any of the means available to the *City* through the provisions of N.C.G.S 160A-175. The civil penalty amount for the first violation of this *ordinance* is \$1,000.00 and a reoccurring violation may result in interruption of *water* service to the offending *customer*. The *City* will issue written notification to the *customer* and occupant of intent to interrupt *water* service and twenty-four (24) hours later will interrupt *water* service unless the violation has ceased. Each day shall constitute a separate violation. If *water* service has been interrupted due to repeat violation of this *ordinance*, service will not be re-instated until the Public Utilities Director has determined that the risk to the *City water* supply has been alleviated or the Public Utilities Director is otherwise assured of compliance. The effective date for Stage 1 and Stage 2 shall be determined by the date in which the stage was implemented by City Council or the City Manager.

ASSESSMENT:

Any civil penalty will be assessed by the Public Utilities Director and based upon the reasonable estimated cost(s) of: correcting the cited violation, the magnitude of the potential risk posed to the public health, safety and welfare by the violation, and the cost of the public safety or other emergency response caused by the violation. The Public Utilities Director will serve written notice of the civil penalty assessment to the offender with the amount assessed.

Penalties not paid within 30 days of the final assessment, or exhaustion of the appeals process, may result in a civil action to collect fines from the offending *water customer*.

VARIANCES:

Variance requests for the Water Shortage Response Plan can be made by petitioning City Council. Variances can be granted if the City Council determines a significant hardship exists and merits relief. The City Council meets in regular session on the first and third Tuesdays of each month. On the first Tuesday, requests by citizens will be heard during the 7:00 p.m. session; on the third Tuesday, requests by citizens will be heard during the 1:00 p.m. session. Requests by citizens to appear on the City Council agenda should be addressed to the City Clerk: (919) 996-3040

222 Hargett Street

Suite 207

Raleigh, NC 27601

EFFECTIVENESS, EVALUATION & REVISION:

The effectiveness of the City of Raleigh's WSRP is determined by comparing the stated water conservation goals with anticipated water use reduction data. To reiterate these goals are:

CONSERVATION STAGE	RESIDENTIAL CONSUMPTION GOAL (GPCPD)
PCM	65 gpcpd
ADVISORY STAGE	60 gpcpd or 8% reduction
STAGE 1	55 gpcpd or 15% reduction
STAGE 2	35 gpcpd or 46% reduction
STAGE 3	25 gpcpd or 61% reduction

(gpcpd = Gallons per Capita per Day)

Other evaluation factors to be considered include:

- Frequency of plan activation;
- Problem periods without activation;
- Total number of violation citations;
- Desired reductions attained;
- Evaluation of demand reductions compared to the previous year's data.

The Plan will be reviewed and revised as needed to adapt to new circumstances affecting water supply and demand, or at a minimum of every five years in conjunction with the updating of our Local Water Supply Plan. The City of Raleigh Public Utilities Director will be responsible for initiating all subsequent revisions.

DEFINITIONS & APPENDICES



DEFINITIONS

Approved (or Approval) = Approved or approval means certified in writing by the Public Utilities Director as an acceptable *water* conservation device, program or methodology for the purpose of water conservation.

Available water supply storage = The total amount of water that is available to the City in the water supply pool(s). The U.S. Army Corps of Engineers will determine this amount for Falls Lake once the water level in Falls Lake drops below 251.5 feet Mean Sea Level.

Automatic spray irrigation system = Any installed irrigation system that can be programmed to operate during certain times and/or conditions and which is connected to the City's WSSP system.

BMP = Best Management Practice.

City = The City of Raleigh.

City reuse water = Effluent water from City facilities, including the E.M. Johnson Water Treatment Plant, Smith Creek Wastewater Treatment Plant, Little Creek Wastewater Treatment Plant and/or Neuse River Wastewater Treatment Plant, which meets or exceeds the minimum quality requirements of the current North Carolina Reuse and Reclaimed Water Quality Standards.

Conservation (or conserve) = Any beneficial reduction in water loss, waste, or use.

Conservation device = Any device, properly installed within a private plumbing or distribution system, to improve water use efficiency within the City's water supply system.

Conservation program = A program that identifies the uses of water within residential *customers*, industry groups, commercial and/or industrial applications, which focuses on BMPs to reduce the consumption of water. The program will be

submitted to Public Utilities for review and approval. Each conservation program should be updated as required by the Public Utilities Director. All certified conservation customers should be publicly recognized as water savers.

Customer = Any person, business, corporation, institution, resident or industry responsible for any property at which water from the City of Raleigh WSSP is received. In the absence of other parties or the failure of other parties to accept the responsibilities herein set forth, the owner of record of the real property shall be ultimately responsible.

Council = City of Raleigh Council members

Enforcement = Means by which ordinances will be carried out.

Hand-held hose = Any hose that is connected to the City's WSSP system and held in the hand during irrigation use.

Hose end sprinkler = An irrigation device that is connected to the City's WSSP system and is not designed to be held in the hand during use. Examples are: single stream, multi-stream, and impact type sprinklers.

Hydrant meter = A water meter specifically designed, fabricated and leased from the City of Raleigh Public Utilities Department for consumers to purchase water from the City from fire hydrants in accordance with the City's Hydrant Meter Program.

Implementation Authority = The designated position required to implement the conservation stage when its corresponding *trigger* has been met. This role is characterized by a primary authority and an absentee authority who will implement the stages in the absence of the primary authority.

Level of response = The necessary restrictions which must be implemented when a *trigger* is met to preserve adequate water supply.

Notification = means and mechanisms by which the public and employees will be informed of the implementation of a conservation stage and its response(s) upon water usage.

Major Water Classes (MWCs) = The largest water using sectors within the City of Raleigh's service area.

Major Water User (MWU) = A water customer who uses 100,000 gallons per day (GPD) or more per account as determined on either an annual or an average day during the City's seasonal water demand period.

Non-Automatic Spray Irrigation System = Any installed irrigation system that is connected to the City's WSSP system and which is operated manually.

Non-essential water use = Categories of water use that are not essential and may be eliminated during times of drought.

Ordinance = An authoritative decree, direction or law governed by the City of Raleigh.

Potable water = Water from the WSSP system of the City which meets or exceeds the minimum requirements of the current Federal and North Carolina Safe Drinking Water Act.

Projection period = The remaining number of days in the calendar year from the date of the water supply projection, plus sixty (60) days.

Public Comment = Period or timeline for public review, suggestions and interaction regarding the WSRP.

Responses = Restrictions or limits on the ways, manner and times that water is used.

Reuse water = City reuse water and/or on-site reuse water.

Severity measures = The identifying characteristics which signal that current water supply is too low to meet current demand. These include, but are not limited to, available water supply, demand, treatment capacity, mechanical failures and source water contamination.

Stage = A resulting group of responses characterized by *triggers* and levels of response.

Trigger(s) = The utilization of a severity measure to characterize the City of Raleigh's WSSP, signaling the commencement and/or cessation of a conservation stage.

Water = Any waters of the City located on or below the land surface as well as water contained within a treatment and distribution center.

Water shortage = When the demands and requirements of water customers served by the City cannot be satisfied without depleting the water supply to or below a critical level; the level at which the continued availability of water for human consumption, sanitation and fire protection is jeopardized.

Water Storage Supply Pool (WSSP) = The public water supply of the City, and the merged utilities, for general use and which supply is recognized as the WSSP water storage supply pool, or the public water supply. of the City by the North Carolina Department of Environment and Natural Resources.

Water customer = Any customer of the City of Raleigh or its surrounding service areas.

Variance = Exemptions to the City of Raleigh's ordinances.

APPENDIX A: Best Management Practices (BMPs):

Indoor Water Uses:

1. Thaw frozen food in the refrigerator or microwave instead of using running water. Wash fruits and vegetables with a vegetable brush in a basin or bowl instead of using running water.
2. Scrape or wipe, rather than rinse, dishes before loading into the dishwasher. Wash only full loads. Consider replacing an old dishwasher with a water and energy saving model.
3. Wash only full loads of laundry or use the appropriate water level or load size selection on the washing machine. Pre-soak heavily soiled items. Use detergent sparingly in order to avoid rinsing more than the normal cycle. Consider purchasing a high efficiency washing machine to save laundry water and energy.
4. Install EPA WaterSense labeled toilets, faucet aerators, and low-flow showerheads.
5. A leaky toilet can waste 200 gallons of water per day. To detect leaks in a toilet, add a few drops of food coloring to the tank water. Do not flush. Wait a few minutes. The toilet is leaking if the colored water appears in the bowl.
6. Commercial and industrial customers not otherwise regulated as a *major water customer* should review their water uses and should consider implementing industry specific best management water conservation practices.
7. Check for leaks in toilets, faucets, shower heads and any other plumbing fixtures and repair these leaks immediately.

Outdoor Water Uses:

1. Check for plumbing leaks. A single dripping faucet can waste hundreds, even thousands, of gallons per year. Most water leaks are easy to detect and repair with basic plumbing skills and a few simple tools.
2. Have soil tested by the North Carolina Department of Agronomy/Soil Testing Section.
3. Plant native trees and shrubs. The North Carolina State University Cooperative Extension Service has excellent suggestions for home gardeners. Mulch shrubs and plants to reduce water loss due to evaporation. Reduce the amount of turf areas and/or mix these with shaded areas to reduce water needs.
4. Raise the height of your lawn mower's blade to let grass grow taller. This reduces water requirements and longer grass blades shade each other, reducing evaporation, and inhibiting weed growth.
5. Water slowly and thoroughly during cool, windless hours to prevent water loss from evaporation.
6. Be attentive if using a hose and sprinkler; consider setting an alarm or the kitchen timer as a reminder to move the hose and sprinkler as needed.
7. Use a rain gauge. One inch of water per week will keep lawns green throughout the summer.
8. Water should be applied slowly to achieve deep penetration and prevent water run-off. Do not water impervious surfaces such as streets, parking lots, driveways and/or sidewalks.
9. Install a drip irrigation system for watering gardens, trees, and shrubs. Drip systems are very efficient because they provide a slow, steady trickle of water to plants at their roots through a network of hidden pipes and hoses.

10. Use properly treated reuse water for irrigation as an alternative water source. Raleigh's water conservation rules do not regulate the amount of reuse water; therefore, any amount can be used during any mandatory water conservation stage. Contact the Raleigh Public Utilities Department for information regarding reuse water availability.
11. Capture rain water in cisterns and rain barrels. The average rainfall in the Raleigh area is approximately 48 inches per year. Run-off from the roof of a typical 2,500 square foot home is approximately 75,000 gallons a year. The City of Raleigh encourages customers to capture rainwater to use for irrigating landscapes.
12. Consider the amount of water being used and look for ways to use less whenever possible. Do not leave water running - use spring loaded or other automatic shut-off devices on hoses or outdoor faucets.
13. Use commercial car washing facilities, especially those which have been certified by the City of Raleigh as water conserving facilities, instead of washing cars at home.
14. Use a broom or blower to remove dust, dirt, leaves and other debris from sidewalks, driveways, porches and/or decks rather than water.

APPENDIX B: Guidelines and Procedures for Enforcement Personnel:

1. A customer is in violation of the prevailing water responses when he/she is using water outdoors in conflict with existing regulations as declared by the City Manager.
2. Right of Access. The Public Utilities Director, or designated staff, has the right to enter, at a reasonable time, any property served by a connection to the City WSSP for the purpose of performing the duties of this Plan. In cases where the property owner, managing agent, or tenant chooses not to provide such access, the Public Utilities Director or authorized staff may obtain a warrant and inspect or may, in accordance with applicable law, interrupt water service to the property.
3. A citation for a violation is warranted when a City of Raleigh employee observes the watering during prohibited days or times.
4. Well water customers are not subject to the conservation stages.